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junction is placed, and a constantan wire is passed through the open tube and fused to the copper block. A copper wire *w* is fused to the top of the copper block, and protected from the hot gases of the furnace by means of a short porcelain tube. The space between the closed tube and the copper block is filled with lead. Thus the closed tube

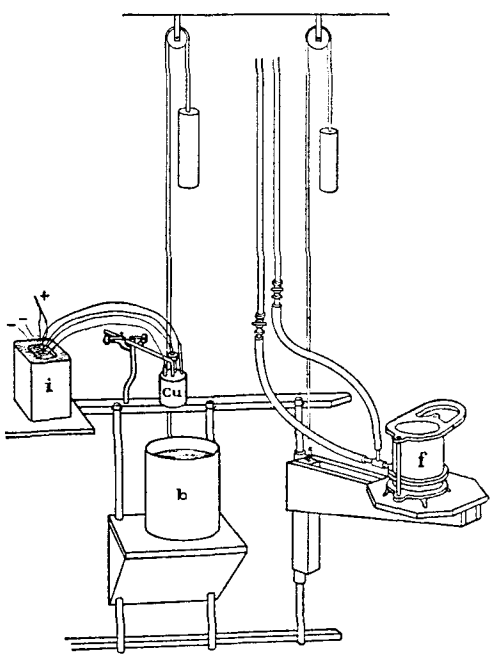

Fig. 9.

experiences the same conditions that are met with in taking an ordinary cooling curve for a molten metal or alloy.

The commutator. — The commutator arrangement, by means of which the two thermo-junctions are alternately thrown in series with the galvanometer, is shown in *c*, Figure 3. It might be added that several curves could be photographed on the film by simply changing the form of the commutator. The alternations were about once a second throughout this work, but the period of the galvanometer was only one fiftieth of a second, and the damping very rapid, so that as many as five alternations per second could be made. This means that

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